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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
09/829,831	04/10/2001	Elizabeth Shriberg	SRI/4316	1269

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Thomason, Moser & Patterson LLP  
Attorneys At Law  
First Floor  
595 Shrewsbury Avenue  
Shrewsbury, NJ 07702

EXAMINER
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ALBERTALLI, BRIAN LOUIS

ART UNIT	PAPER NUMBER
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2655

DATE MAILED: 10/12/2004

Please find below and/or attached an Office communication concerning this application or proceeding.

## Office Action Summary

Application No.

09/829,831

Applicant(s)

SHRIBERG ET AL.

Examiner

Brian L Albertalli

Art Unit

2655

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

### Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

### Status

- 1) ☒ Responsive to communication(s) filed on 02 July 2004.
- 2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

### Disposition of Claims

- 4) ☒ Claim(s) 1-21 is/are pending in the application.
- 4a) Of the above claim(s) \_\_\_\_\_ is/are withdrawn from consideration.
- 5) ☐ Claim(s) \_\_\_\_\_ is/are allowed.
- 6) ☒ Claim(s) 1-21 is/are rejected.
- 7) ☒ Claim(s) 8 is/are objected to.
- 8) ☐ Claim(s) \_\_\_\_\_ are subject to restriction and/or election requirement.

### Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on \_\_\_\_\_ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.  
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).  
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

### Priority under 35 U.S.C. § 119

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some \* c) ☐ None of:
- ☐ Certified copies of the priority documents have been received.
  - ☐ Certified copies of the priority documents have been received in Application No. \_\_\_\_\_.
  - ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

\* See the attached detailed Office action for a list of the certified copies not received.

### Attachment(s)

- 1) ☒ Notice of References Cited (PTO-892)
- 2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
- 3) ☐ Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08)  
Paper No(s)/Mail Date \_\_\_\_\_
- 4) ☐ Interview Summary (PTO-413)  
Paper No(s)/Mail Date. \_\_\_\_\_
- 5) ☐ Notice of Informal Patent Application (PTO-152)
- 6) ☐ Other: \_\_\_\_\_

**DETAILED ACTION**

***Response to Arguments***

1. Applicant's arguments with respect to claims 1-21 have been considered but are moot in view of the new ground(s) of rejection.

***Claim Objections***

2. Claim 8 is objected to because of the following informalities: in line 2, "including" should be --includes--. Appropriate correction is required.

***Claim Rejections - 35 USC § 102***

3. The text of those sections of Title 35, U.S. Code not included in this action can be found in a prior Office action.
4. Claims 1-3 and 10-13 are rejected under 35 U.S.C. 102(e) as being anticipated by Pickering (U.S. Patent 6,496,799).

In regard to claims 1, 11, and 21, Pickering discloses a method, apparatus (computer workstation), and electronic storage medium for processing a speech signal comprising:

extracting prosodic features from a speech signal (spoken pitch);

Art Unit: 2655

modeling the prosodic features to identify at least one speech endpoint (fundamental frequency is derived and then low pass filtered to find gross pitch movements, column 10, lines 30-40); and

producing an endpoint signal corresponding to the occurrence of the at least one speech endpoint (long decline in pitch value indicates end of the input, column 10, lines 21-23).

In regard to claims 2 and 12, Pickering discloses processing pitch information within the speech signal (column 10, lines 30-40).

In regard to claims 3 and 13, Pickering discloses determining a duration pattern (a test is made to see whether or not the input is silence, column 8, lines 21-22); and

performing a pause analysis (system checks whether the amount of silence exceeds a predetermined time-out period, column 8, lines 22-24).

***Claim Rejections - 35 USC § 103***

5. The text of those sections of Title 35, U.S. Code not included in this action can be found in a prior Office action.

Art Unit: 2655

6. Claims 4-5 and 14-15 are rejected under 35 U.S.C. 103(a) as being unpatentable over Pickering, in view of Sonmez et al. (*Modeling Dynamic Prosodic Variation for Speaker Verification*).

Pickering is silent as to the details of how the pitch information in the signal is processed.

Sonmez et al. discloses generating a pitch contour (page 2, 1<sup>st</sup> column, second paragraph, third paragraph, and equations 1 and 2);

producing a pitch movement model from the pitch contour; and

extracting a pitch movement slope from the pitch movement model (page 2, section 3, first paragraph and segment slope equation).

It would have been obvious to one of ordinary skill in the art at the time of invention to modify Pickering to extract pitch slope from the pitch movement model, since the stylized contours provide significant data reduction, as taught by Sonmez et al. (page 2, section 3, lines 4-5).

7. Claims 6 and 16 are rejected under 35 U.S.C. 103(a) as being unpatentable over Pickering, in view of Sonmez et al., and further in view of Shriberg et al. (*Prosody-based Automatic Segmentation of Speech into Sentences and Topics*).

Pickering discloses tracking the mean (intermediate range) to recognize a slowly decreasing mean, signaling the end of a phrase (Fig. 4B, column 10, lines 6-13).

Neither Pickering nor Sonmez et al. discloses the at least one pitch parameter is a difference between the pitch information in the speech signal and baseline pitch information.

Shriberg et al. discloses determining a difference between pitch information in the speech signal and baseline information (the pitch range of a word relative to a baseline, page 135, 2<sup>nd</sup> column, 2<sup>nd</sup> paragraph, lines 1-5 and lines 11-16).

It would have been obvious to one of ordinary skill in the art at the time of invention to further modify the combination of Pickering and Sonmez et al. to determine a difference between pitch information and baseline information since the baseline is the most useful pitch parameter out of baselines, toplines, and intermediate range measures, as taught by Shriberg et al. (page 135, 1<sup>st</sup> column, 2<sup>nd</sup> paragraph, lines 8-16).

8. Claims 7-9 and 17-19 are rejected under 35 U.S.C. 103(a) as being unpatentable over Pickering.

In regard to claims 7 and 17, Pickering discloses generating a posterior probability regarding the at least one speech endpoint.

The prosodic features are used to detect when the speaker has effectively finished talking (Fig. 3, step 560, column 9, lines 2-6 and lines 50-54). The test of step 560 indicates how likely the caller is to have finished (column 11, lines 2-9).

Art Unit: 2655

Official notice is taken that this likelihood would suggest to one of ordinary skill in the art at the time of invention using a posterior probability, since the well known likelihood function is a posterior probability.

In regard to claims 8 and 18, Pickering discloses the likelihood of a plurality of speaker states, including that a speaker has completed an utterance (finished speaking), that the speaker is pausing due to hesitation (the speaker will continue), and that the speaker is talking fluently (the speaker is in trouble and losing coherence, which would indicate that the speaker is not speaking fluently).

Pickering discloses the prosodic test at step 560 checks the pitch pattern for a long decline in pitch value at the end of an input, indicating the speaker is finished (column 10, lines 21-23); a final fall of short duration, which indicates the speaker is going to continue (column 10, lines 3-4); or a final rise with an excessively long duration, which indicates the speaker is in trouble and losing coherency (column 10, lines 4-5 and lines 28-29).

Thus, the examiner takes official notice that this would suggest to one of ordinary skill in the art at the time of invention to obtain the posterior probabilities that a that a speaker has completed an utterance, that the speaker is pausing due to hesitation, and that the speaker is talking fluently, since the well known likelihood function is a posterior probability.

In regard to claims 9 and 19, Pickering's disclosed prosodic test at step 560 is based on a likelihood that the speaker is finished speaking (column 11, lines 2-9). If the speaker is not finished, steps 520-560 are repeated (see Fig. 3), which would suggest to one of ordinary skill in the art at the time of invention to update the posterior probability at step 560 as the speech signal is processed.

9. Claims 10 and 20 are rejected under 35 U.S.C. 103(a) as being unpatentable over Pickering, in view of Shin et al. (*Speech/Non-Speech Classification Using Multiple Features for Robust Endpoint Detection*).

Pickering discloses that after the prosodic test for an endpoint at step 560, further action is taken at step 570.

Pickering does not disclose that the further step is a speech recognition routine for processing the speech signal using the at least one speech endpoint.

Shin et al. discloses that the inaccurate detection of endpoints is a major cause of errors in speech recognition systems (page 1399, 1<sup>st</sup> column, section 1, 2<sup>nd</sup> paragraph, lines 1-3).

It would have been obvious to one of ordinary skill in the art at the time of invention to modify Pickering to perform speech recognition at step 570 using the speech endpoint, since increased endpoint detection accuracy increases the speech recognition performance, as taught by Shin et al. (page 1401, 1<sup>st</sup> column, section 4, 6<sup>th</sup> paragraph, lines 1-2 and page 1402, 1<sup>st</sup> column, 2<sup>nd</sup> paragraph, lines 7-10).



### ***Conclusion***

10. The prior art made of record and not relied upon is considered pertinent to applicant's disclosure. Wilcox et al. (U.S. Patent 5,199,077) discloses an endpoint detection technique that tracks the posterior probability of an end state of a word. Essa (*Using Prosody in Automatic Segmentation of Speech*) discloses a method of segmentation of speech that uses the length of syllables as a prosodic feature. Takagi et al. (*Segmentation of Spoken Dialog by Interjections, Disfluent Utterances and Pauses*) discloses a HMM based method of endpoint detection that identifies pauses, interjections and fluent speech.

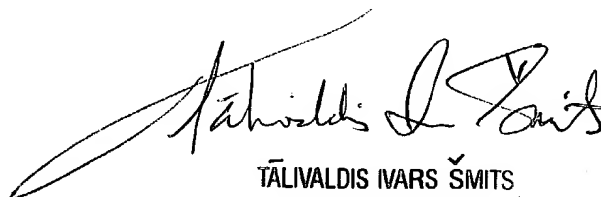
Any inquiry concerning this communication or earlier communications from the examiner should be directed to Brian L Albertalli whose telephone number is (703) 305-1817. The examiner can normally be reached on Mon - Fri, 8:00 AM - 5:30 PM, every second Fri off.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Talivaldis Smits can be reached on (703) 305-3011. The fax phone number for the organization where this application or proceeding is assigned is 703-872-9306.

Art Unit: 2655

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

BLA 10/6/04



TĀIVALDIS IVARS ŠMITS  
PRIMARY EXAMINER